

PSEUDO-CURLY TOP OF TOMATO

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In the early 1950's, a disease of tomato (*Lycopersicon esculentum* Mill.) resembling sugar beet curly top was reported in Florida (2,7). Simons and Coe were first to distinguish this disease from beet curly top, caused by the beet curly top virus, on the basis of vector specificity (6). Hence the disease was named pseudo-curly top and the etiologic agent was presumed to be pseudo-curly top virus (PCTV). This disease was thought to be endemic during the last three decades in south Florida (6,9), however, no simple diagnostic technique has been available to study the epidemiology and geographic distribution of PCTV. To date sugar beet curly top disease is still not known to occur in Florida.



Figure 1. *Lycopersicon esculentum* (tomato) inoculated with pseudo-curly top virus, showing cupping (arrow) and chlorosis of leaves.



Figure 2. *Solanum nigrum* (nightshade) is a common weed host that can be a reservoir for both the pseudo-curly top virus and the treehopper vector. Note both downward and upward leaf curling (arrows) and leaf chlorosis on this greenhouse inoculated plant.



Figure 3. Nymph of *Microtalis malleifera* (treehopper), nymphs tend to be gregarious and often form colonies near the apex of host plants (5).



Figure 4. Adult of *M. malleifera*, adults are abundant during the warmer months on weed hosts but populations remain low from October through April (5).

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SYMPTOMS AND HOST RANGE: Symptoms include chlorosis of the leaf edge, vein clearing, leaf curling and cupping as well as apical shoot proliferation (Fig. 1). Infected plants are often stunted and rarely set fruits. Symptoms on nightshade (*Solanum nigrum* L.), a common weed include vein clearing and chlorosis followed by downward and upward leaf curlings (Fig. 2). The host range of PCTV is rather limited. It includes tomato, nightshade, jimsonweed (*Datura stramonium* L.), tobacco (*Nicotiana glutinosa* L.), chickweed (*Stellaria medea* L.), eggplant (*Solanum melongena* L.), lettuce (*Lactuca saliva* L.) and ragweed (*Ambrosia* sp.) (3,4,5).

DISEASE DEVELOPMENT: The virus is transmitted by a treehopper, *Microtalis malleifera* Fowler (Homoptera: Membracidae) in a semipersistent manner (6,8). Both nymphs (Fig. 3), which retain virus transmissibility after molts, and adults (Fig. 4) vector PCTV. Nightshade is considered an effective reservoir host plant because of its virus susceptibility, preference by treehoppers, and widespread occurrence near tomato fields (8). PCTV is not transmitted mechanically or through seed, so introduction into the field is usually by the treehopper vector. Disease incidence is greatest in late summer and early fall plantings of tomato when the vectors are most likely to move from the weed reservoir hosts (6).

CAUSAL AGENT AND DIAGNOSTIC TECHNIQUES: This virus is provisionally placed in the geminivirus group. Virus particles contain DNA, are isometric and occur in pairs when observed by the transmission electron microscope in partially purified virus preparations (3). PCTV is also serologically related to the beet curly top geminivirus as determined by indirect enzyme-linked immunosorbent assay (ELISA), (3). Nuclear inclusions and ring-shaped fibrillar bodies present in infected tissue also support a geminivirus etiology (1). For diagnosis, the type of inclusions only indicates that a geminivirus is present and cannot distinguish PCTV specifically. PCTV can be confirmed by double antibody sandwich ELISA and/or transmission by its specific treehopper vector (3).

SURVEY AND DETECTION: Look for plants that have a bushy appearance with vein clearing and general leaf yellowing. Severe leaf cupping is often present and stems may be brittle. Look for treehopper nymphs in colonies near the apex of host plants. Adults can be found feeding on the stems and petioles.

CONTROL: Traditional methods of virus disease control such as vector control, prompt removal of infected plants, eliminating weed hosts near plantings, altering planting dates and breeding for resistance are recommended.

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